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考虑频率依赖性的涂层复合结构固有特性求解

Solving nature characteristics of coating composite structural considering frequency-dependence property coating materials

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中文关键词: 频率依赖性 涂层 复合结构 固有特性

英文关键词:frequency-dependence coating composite structure nature characteristics

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中文摘要:

粘弹性阻尼材料的力学特性参数会随着频率的变化而改变,即具有频率依赖性,因而传统的动力学建模及分析方法不能满足实际涂层结构优化设计的需要。在简要介绍粘弹材料频率依赖性的基础上,本文提出用特征向量增值法来求解涂层复合结构的固有特性,并详细推导了特征向量增值法的求解原理。由此,提出了特征向量增值法的计算流程,包无阻尼系统的固有特性,用Fox and Kapoor或者Nelson方法计算复特征向量增量;用Rayleigh熵法求解复特征值。最后,以涂敷粘弹性阻尼材料的钛基薄板为例,求解了该复合结有特性,并与经典的模态应变能法进行了比较,证明了所提方法的正确性。

英文摘要:

Mechanical parameters of viscoelastic damping materials will change with frequency,namely have frequency-dependent property,thus the traditional dynam modeling and analysis methods are not satisfied with the requirement of optimization design of coating structure.On the basis of introducing the frequency-dependence property of visco-elastic damping materials,an efficient numerical method which is named as eigenvector increment method (EIM) is presented for analyzing the nature characteristics of coating composite structure in the paper.The theory of EIM is derived and relative solving flow chart is put forward flow chart includes calculating the nature characteristics of undamped system,solving the complex eigenvector increment used Fox and Kapoor or Nelson method,acquiring the complex eigenvalues adapted Rayleigh quotient method.At last,a titanium thin plate coated visco-elastic damping layer is taken as study object,the nature characteristics are solved by EIM.The correctness of proposed method is proved,by comparing the results with the classical modal strain en (MSE) method.

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